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Impact of village adoption programme on farmers' knowledge and adoption of recommended production technologies

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ABSTRACT

This study evaluated the impact of a three-year village adoption programme (VAP) implemented by Regional Agricultural Research Station, Acharya NG Ranga Agricultural University, Lam, in Venigandla village, Andhra Pradesh, on farmers' knowledge and adoption of crop production technologies. Employing an ex-post facto research design with a pre-post data collection method from 90 randomly selected beneficiary farmers, the study assessed changes in knowledge across integrated nutrient management (INM) and pest management in cotton and chilli and high-yielding varieties and pest management in black gram. The VAP, which involved constraint identification, participatory planning, training, demonstrations and input provision, resulted in a substantial increase in farmers' knowledge level across all assessed technologies post-intervention. Similarly, a significant upward trend was observed in the adoption rates of recommended practices for cotton, black gram and chilli. Furthermore, the majority of farmers expressed a positive perception of the services provided under the VAP. The findings highlight the effectiveness of the village adoption model in enhancing farmers' knowledge and promoting the adoption of improved agricultural practices, ultimately contributing to improved productivity and livelihoods in the adopted village.

Keywords: Village adoption programme; knowledge level; technology adoption; impact assessment

INTRODUCTION

Among the many strategies employed for rural upliftment, village adoption has emerged as a significant approach, undertaken by individuals, NGOs, private and public organizations and academic institutions. Village adoption concept was evolved and adopted in many states of India to energize the rural economy. The process of village adoption is an experimentation and involvement of faculty members to drive the process of development in a selected village, in which, the baseline survey and introduction of new scientific interventions should be conducted to reveal certain crucial areas that need urgent attention for rural development and also the development of the villages in different spheres of the socio-economic arena. The process of village adoption is involvement of faculty members to drive the process of development in a selected village (Senthilkumar et al 2019).

In this context, the Acharya NG Ranga Agricultural University (ANGRAU) has mandated that each Regional Agricultural Research Station, under its jurisdiction, should adopt at least one village for a period of three years. As part of this initiative, RARS, Lam, Andhra Pradesh adopted Venigandla village, located in Pedakakani Mandal of Guntur district, Andhra Pradesh, for the period 2019-2022, with financial assistance from ANGRAU.

The primary cropping pattern of the people of Venigandla includes chilli, cotton and black gram. The soils are predominantly black soils (90%) with 10 per cent red soils and most farmers rely on rainfed agriculture, with a few depending on bore-wells for irrigation.

Considering the limited exposure to modern agricultural technologies, RARS, Lam, Andhra Pradesh selected Venigandla village for adoption. A baseline survey and participatory rural appraisal (PRA) were conducted to identify key constraints and design appropriate interventions. The programme was implemented over a period of three years, focusing on bridging knowledge gaps, enhancing adoption of improved practices and assessing the overall impact on agricultural production and livelihood. Thus the present study was undertaken to evaluate the impact of the village adoption programme (VAP) on farmers' knowledge and adoption of crop production technologies in Venigandla village.

METHODOLOGY

An ex-post facto research design was employed for the study to assess the effect of VAP on farmers' knowledge and adoption with respect to crop production and allied enterprises in Venigandla village of Pedakakani Mandal, Guntur district, Andhra Pradesh where the VAP was operational during 2019-20 to 2021-22. The data were collected from the 90 randomly selected respondents who were continuously benefitted from VAP during 2019-20 to 2021 22. A pre-post data collection method was employed. The baseline survey was conducted prior to the implementation of the VAP and the post-intervention survey was carried out upon the programme's completion, to assess changes in farmers' knowledge and adoption levels. A personal interview method was used with the help of the constructed interview schedule. The collected data were analysed using mean scores and frequency distributions to determine the extent of change in knowledge and adoption due to the intervention.

As a part of the VAP, the initial step involved identifying key production constraints, their root causes and the factors contributing to yield gaps. This was accomplished through a baseline survey and PRA. Based on the findings, appropriate interventions were planned and implemented through regular focus group discussions with farmers and in collaboration with relevant stakeholders. The aim was to bridge the yield gap and improve agricultural production sustainably.

RESULTS and DISCUSSION

Production constraints identified and strategies implemented in adopted village

Table 1 presents the major production constraints identified and the strategies implemented under the VAP. The key constraints and corresponding interventions are detailed below:

Incidence of pink bollworm in cotton: A significant yield loss of 25-30 per cent in cotton was reported due to a severe pink bollworm infestation. It was due to lack of awareness among farmers regarding IPM, over reliance on chemical pesticides, leading to insecticide resistance development in pests and increased cost of cultivation and reduced net returns. To address these problems, trainings and demonstrations on IPM practices, distribution of pheromone traps, *Trichogramma* cards and neem oil and organization of filed visits and field days were done.

Severe damage to BG II cotton by pink bollworm and yield losses were observed in many regions of Gujarat and some parts of Andhra Pradesh, Maharashtra and Telangana. Studies conducted at ICAR-CICR showed that pink bollworm had developed resistance to two Cry toxins deployed in BG II (Kranthi 2015). Anon (2018) has suggested IPM strategies including installation of pheromone traps and release of *Trichogramma bactrie* for the management of pink bollworm in cotton.

Sucking pests, yellow mosaic virus (YMV) and low yields in black gram: Low yields in black gram were attributed to high incidence of sucking pests and YMV and use of low-yielding local varieties. For this, high-yielding varieties LBG 884 and LBG 904, developed by RARS, Lam were introduced; training programmes were organized and yellow and blue sticky traps were provided and demonstrated.

Aryal et al (2022) reported that the major reasons behind low productivity of black gram were insufficient disease resistance and high yielding varieties, biotic and abiotic factors and lack of proper crop management practices. Different fungal, bacterial and viral diseases and sucking insects are the biotic factors which are detrimental for black gram cultivation and were reported during growing season. Yellow mosaic virus causing yellow mosaic is considered as major factor for low productivity of black gram (Naeem et al 2022).

Khatake et al (2023) evaluated five different colour sticky traps in three pulse crops viz black gram, cowpea and green gram and reported that blue was most attractive colour for leafhoppers and thrips, whereas, maximum whiteflies were trapped on yellow colour.

Indiscriminate use of chemical fertilizers: Farmers were applying excessive quantities of chemical fertilizers without understanding soil nutrient status. To overcome this, awareness programmes on the importance of soil testing were conducted and soil test-based nutrient management was recommended; proper soil sampling techniques were demonstrated; INM was promoted and bio-fertilizers were distributed.

Singh et al (2021) reported that soil test-based fertilizer application improves productivity, profitability and nutrient use efficiency. Integrated nutrient management (INM), which entails the maintenance/ adjustment of soil fertility to an optimum level for crop productivity to obtain the maximum benefit from all possible sources of plant nutrients, organics as well as inorganics, in an integrated manner (Aulakh and Grant 2008), is an essential step to address the twin concerns of nutrient excess and nutrient depletion.

Indiscriminate use of chemical pesticides: Uncontrolled and excessive use of pesticides not only escalated pest management issues but also increased input costs. Regular group discussions and awareness campaigns on IPM in major crops were conducted and eco-friendly pest control measures were promoted by distributing pheromone traps, sticky traps, *Trichogramma* cards and neem oil.

The excessive usage of pesticides in the agricultural fields has destroyed the ecosystems as well as the human health (Dasgupta et al 2009); particularly in an agrarian country like India, this has become a serious problem, which requires immediate attention.

Integrated pest management (IPM) is the comprehensive and coordinated use of cultural, biological and chemical tactics to reduce a pest population below an acceptable threshold (Riyaz and Kathiravan 2019).

Poor veterinary services: Farmers reported the absence of veterinary facilities in the village. The nearest veterinary hospital was located 30 km away, limiting the access to timely animal healthcare. Veterinary health camps were conducted and it was ensured that timely services including vaccinations, deworming and treatment of seasonal diseases were there.

Ahuja et al (2008) reported that the productive potential of animals depends crucially on the animal health system and on this count, India has a poor record. The quality of livestock support services remains poor and disease surveillance, control, diagnostics and reporting continue to be weak.

Lack of additional income for women: Due to the rainfed nature of agriculture in the village, many women were under-employed with no supplementary source of income. Kitchen garden kits among farm women were distributed and trainings on kitchen gardening to enhance nutritional security and provide an additional source of income were conducted.

Ghosh and Maharjan (2014) reported that kitchen gardening has contributed in increasing area, production and consumption of vegetables and fruits at household level and households have also been able to increase cash income to some extent.

Ojo (2017) revealed that respondents under adopted village programme considered inadequate funds (86.7%), poor road network (access to farm) (80.0%), lack of good processing facilities (69.2%), lack of access to market (66.7%) and inadequate storage facilities (53.3%) as severe constraints.

Knowledge level of the farmers before and after village adoption programme (VAP)

The knowledge level of farmers in six key areas was assessed before and after the implementation of the VAP (Table 2).

The data show that, whereas, only 11.11 per cent farmers had high level of knowledge in INM in cotton before VAP, it increased to 54.44 per cent after the VAP. Similarly, only 7.78 per cent farmers had high knowledge of pinkboll worm management in cotton before VAP which increased to 46.67 per cent after the VAP. The high level of knowledge wrt sucking pests management in cotton, high yielding and YMV resistant varieties in black gram, sucking pests management in black gram, integrated fertilizer management in chilli and integrated pest management in chilli, which was of 12.22, 5.55, 14.44, 4.44 and 13.33 per cent farmers only before the VAP, increased to 51.11, 48.88, 55.56, 41.11 and 53.33 per cent farmers respectively after the VAP.

Across all the technologies assessed, the village adoption programme demonstrated a substantial

Table 1. Production constraints identified and strategies implemented in adopted village

Constraint	Strategies implemented
Pink bollworm in cotton	Organized trainings and demonstrations in cotton Farmers provided with critical inputs like pheromone traps, tricho-cards and neem oil Regular field visits and field days were organized and timely suggestions were given
Sucking pests, YMV and poor yields in black gram	Introduced LBG 884 and LBG 904 varieties of black gram Training programmes were organized regularly Critical plant protection inputs like yellow sticky traps, blue sticky traps and chemicals were provided and demonstrated Regular field visits were organized and timely suggestions were given
Indiscriminate use of chemical fertilizers	Conducted awareness programmes on importance of soil testing and soil test-based nutrient application Demonstrated soil sample collection process Emphasized upon and suggested importance of integrated nutrient management in major crops through training programmes and awareness campaigns Bio-fertilizers provided to the farmers
Indiscriminate use of chemical pesticides	Organized regular awareness camps and group discussions on importance of integrated pest management in major crops Facilitated the farmers by providing critical inputs like yellow sticky traps, blue sticky traps, pheromone traps, tricho-cards and neem oil etc Demonstrated IPM for pink bollworm in cotton Demonstrated seed treatment in black gram for sucking pest control Demonstrated IPM in chilli
Poor veterinary services	Conducted veterinary camps and made timely services with respect to vaccination, seasonal disease control, deworming and other healthcare treatments in coordination with veterinary department
Women having no additional income	Provided farmers and farm women with kitchen garden kits Conducted training programmes on kitchen gardening

Table 2. Knowledge level of the farmers before and after the introduction of village adoption programme

Component	Farmers' (n = 90) knowledge level											
	Before VAP						After VAP					
	High		Medium		Low		High		Medium		Low	
	f	%	f	%	f	%	f	%	f	%	f	%
INM in cotton	10	11.11	26	28.89	54	60	49	54.44	27	30.00	12	13.33
Pink bollworm management in cotton	7	7.78	22	24.44	61	67.78	42	46.67	38	42.22	10	11.11
Sucking pests management in cotton	11	12.22	45	50.00	34	37.78	46	51.11	35	38.87	9	10.00
High yielding and YMV resistant varieties in black gram	5	5.55	33	36.67	52	57.78	44	48.88	39	43.33	7	7.78
Sucking pests management in black gram	13	14.44	23	25.56	54	60.0	50	55.56	34	37.78	6	6.67
Integrated fertilizer management in chilli	4	4.44	39	43.33	47	52.22	37	41.11	36	40.00	17	18.89
Integrated pest management in chilli	12	13.33	33	36.67	45	50.00	48	53.33	32	35.56	10	11.11

positive impact on farmers' knowledge level. The transition from low to high knowledge categories was consistent across cotton, black gram and chilli crops. This improvement can be credited to the participatory approach, frequent interactions, on-field demonstrations and supply of critical inputs under the programme. The enhanced knowledge base was expected to translate into better adoption of recommended practices, improved productivity and sustainable farming outcomes in the adopted village.

Adoption level of farmers before and after village adoption programme

To evaluate the effectiveness of the VAP, the extent of technology adoption by farmers was assessed before and after its implementation. The data in Table 3 reveal that INM, the practices like pink bollworm management in cotton, sucking pests management in cotton, high yielding varieties in black gram, sucking pests management in black gram, integrated fertilizer management in chilli and IPM in chilli were adopted by 15.56, 26.67, 34.44, 13.33, 21.11, 7.78 and 23.33 per cent farmers before the VAP, whereas, it was adopted by 67.78, 80.00, 75.56, 72.22, 65.56, 63.33 and 74.44 per cent of them respectively, after the VAP.

The adoption levels across all components showed a significant upward trend after the implementation of the village adoption programme. The increase in adoption rates indicates that when farmers were equipped with the right knowledge, practical demonstrations and timely support, they were more likely to adopt improved agricultural practices. These changes were expected to lead to enhanced crop productivity, reduced production cost and increased income and livelihood security for the farming community in the adopted village.

Overall perceptions of farmers about village adoption programme

To assess the effectiveness and acceptance of the VAP, farmers' perceptions were recorded across six key parameters using a three-point continuum: Good, Satisfactory and Not satisfactory. The results, presented in Table 4, reflect that majority of the respondents had good perception about the services rendered by the scientists. Data show that 66.67, 73.33, 83.33, 90.00, 93.33 and 86.67 per cent respondents reported that the regularity in visits to the village, diagnosis of the problems, solutions suggested for the field problems, scientists culture and communication, training programmes organised and in time response in emergency by the scientists respectively, were good.

Village adoption programme, as reported by Shivashankar et al (2023), significantly improved farmers' knowledge and technology adoption. Farmers experienced less labour, better animal care and enhanced crop management via trainings and demonstrations. Their understanding of kitchen gardening also grew. Consequently, farmers showed greater awareness, empowerment and ability to use resources and new technologies. Crop diversification, combining improved varieties and animal components, increased the productivity and profits of smallholder farmers.

Table 3. Adoption level of the farmers before and after the introduction of village adoption programme (VAP)

Component	Number of farmers (n = 90)							
	Adoption before VAP				Adoption after VAP			
	Adopted		Not adopted		Adopted		Not adopted	
	f	%	f	%	f	%	f	%
INM in cotton	14	15.56	76	84.44	61	67.78	29	32.22
Pink bollworm management in cotton	24	26.67	66	73.33	72	80.00	18	20.0
Sucking pests management in cotton	31	34.44	59	65.56	68	75.56	22	24.44
High yielding varieties in black gram	12	13.33	78	86.67	65	72.22	25	27.78
Sucking pests management in black gram	19	21.11	71	78.89	59	65.56	31	34.44
Integrated fertilizer management in chilli	7	7.78	83	92.22	57	63.33	33	36.67
IPM in chilli	21	23.33	69	76.67	67	74.44	23	25.56

Table 4. Overall perceptions of farmers about village adoption programme (VAP)

Component	Perceptions of farmers (n = 90)					
	Good		Satisfactory		Not satisfactory	
	f	%	f	%	f	%
Regularity in visits to the village	60	66.67	27	30.00	3	3.33
Diagnosis of the problems	66	73.33	24	26.67	0	0
Solutions suggested for the field problems	75	83.33	15	16.67	0	0
Scientists' culture and communication	81	90.00	9	10.00	0	0
Training programmes organised	84	93.33	6	6.67	0	0
In time response in emergency	78	86.67	12	13.33	0	0

Papireddy et al (2023) found significant yield increases in Brahmanadinne village, Karnataka, under VAP: red gram (23.43%), finger millet KMR-630 (10.43%), finger millet ML 365 (17.93%), cowpea (37.87%) and chilli (16.37%). Farmer awareness score rose from 4.46 (pre-VAP) to 10.03 (post-VAP).

CONCLUSION

This study evaluated the impact of a three-year village adoption programme (VAP) by Acharya NG Ranga Agricultural University in Venigandla village, Andhra Pradesh. The VAP aimed to improve farmers' knowledge and adoption of better farming techniques for key crops like cotton, black gram and chilli. The research compared farmers' knowledge and adoption levels before and after the VAP. The programme involved identifying farming challenges, planning solutions with farmers, providing trainings and demonstrations and distributing essential resources. The results showed a significant increase in farmers' understanding of improved farming methods for all the crops studied after the VAP. There was also a clear rise in the number of farmers actually using these recommended practices. Most farmers had a positive view of the support they received from the scientists through the VAP. The study concludes that the village adoption programme was effective in boosting farmers' knowledge and encouraging them to use better farming techniques, which is expected to lead to better harvests and livelihoods in the village.

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